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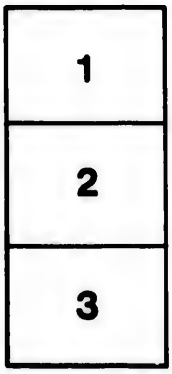

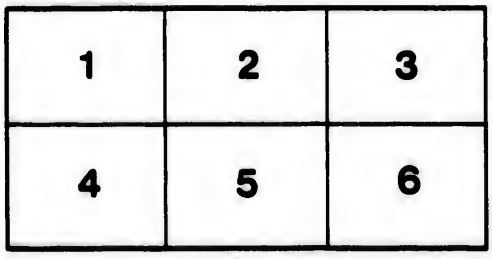

[Reprint from ANNALS OF SURGERY, November, 1885.]

ON PRELIMINARY LIGATURE OF THE LINGUAL ARTERIES IN EXCISION OF THE TONGUE, WITH A REPORT OF THREE CASES.[1]

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THE operation which I intend discussing in this paper is that introduced by Prof. Billroth, of Vienna, viz., excision of the tongue by scissors, with preliminary ligature of the linguals. In excising the tongue for malignant disease, besides the necessity for avoiding danger from hæmorrhage, it is important that structures in the neighborhood, which have become involved, should be removed, and the operation which facilitates this removal, without running much additional risk, is the one to be preferred.

Billroth's operation, in my opinion, fulfils these conditions, and the mortality following it is not greater than that of other operations for removal of the tongue.

In most of the English and American text-books on Surgery it is but briefly or not at all mentioned. Ligature of the lingual artery is described, certainly, but only as an operation to be performed on the dead subject, the difficulties and dangers attending its performance on the living subject are passed over.[2]

I shall briefly describe Billroth's operation, mentioning the difficulties I have met with in performing it.

[1] Read before the Surgical Section of the Canada Medical Association, September, 1885.

[2] Since writing the above Mr. Henry T. Butlin's admirable work on "*Diseases of the Tongue*" has appeared, in which the various operations for removal of the tongue, including ligature of the lingual are fully described.

Operation.—The head of the patient having been well thrown back and the chin turned to the side opposite to that on which the artery is to be tied, a curved incision is made from near the symphysis menti to near the angle of the lower jaw, the convexity downwards, having its lowest portion running along the upper border of the great cornu of the hyoid bone; a careful dissection is then made through the platysma and deep cervical fascia, and if any veins are cut they should be ligatured before proceeding further with the operation. The tendon of the digastric muscle should now be searched for, and in the angle this tendon forms with the hyoid bone, the artery will be found—but not immediately, for covering it we have the hyoglossus muscle with the hypoglossal nerve and ranine vein running over it. The hyoglossus muscle should be carfully divided and then, all bleeding having been arrested by Pean's forceps and ligatures, the artery is felt pulsating at the bottom of the wound. Hæmorrhage should now be completely arrested and the artery being brought into view can be easily tied. I have been in the habit for some time past, when ligaturing arteries, of placing two ligatures on the vessel and cutting between them, and I do the same when ligaturing the lingual. By this method we are certain of the artery being occluded, and cannot easily mistake it for the large vein which sometimes accompanies it. The artery on the opposite side having been secured in the same way, any glands that may be involved should be looked for and removed through these incisions in the neck. As a rule, they can be found without difficulty. In all my cases I had to remove the submaxillary gland of one side, and in two, some of the cervical glands. If the submaxillary glands are not involved they should be treated tenderly and not cut into, as afterwards they may take on troublesome inflammatory action.

The mouth should now be kept open with a gag and the tongue drawn out by a double ligature passed through its substance about an inch from the tip. The operator, holding the ligature in his left hand, draws the tongue outwards and upwards and removes it with a straight pair of scissors. The attachments of the tongue to the jaw and pillars of the fauces should first be freed and then the muscles at the base, and the attach-

ment to the hyoid bone divided with a few short cuts, and the whole tongue will come away, leaving the epiglottis behind. The removal of the tongue takes, as a rule, only two or three minutes. If the tissues of the floor of the mouth be involved, they should now be attended to.

The wounds in the neck, which during the excision of the tongue should be filled with carbolized sponges, are then sewed up with catgut or silk ligatures and dressed with iodoform and pads of jute or cotton wool. If the floor of the mouth has been removed it will be better to pass a large drainage tube into the mouth through the neck incision; in fact, this ought to be done in every case. The mouth is now packed with iodoform gauze and the operation is complete. The after-treatment is the same as after excision of the tongue by other methods, and I shall not now discuss it.

The difficulties of the operation are not so great as I had expected, and any one with a fair knowledge of the anatomy of the parts, and some experience in operating, can easily overcome them. The following points are worth remembering in performing the operation: (1.) The veins in the neighborhood of the hyoid bone (such as the facial, anterior division of the temporo-maxillary and the trunk formed by these two) are frequently of large size, and if wounded give rise to tremendous hæmorrhage, so if possible, when seen, they should be divided between two ligatures. If by accident they should be cut, the hæmorrhage can be quickly arrested by Pean's forceps. It is very important that all hæmorrhage should be arrested before attempting to pass a ligature round the artery, as otherwise the difficulties of the operation are much increased. The large ranine vein frequently passes beneath the hyoglossus muscle with the artery, and has been mistaken and tied for the artery by Billroth. He mentions that this occurred on two occasions in old people who had thick-walled veins.

(2.) The submaxillary gland is frequently of large size, especially when diseased, and covers the space between the jaw and the hyoid bone. This complicates the operation and the gland has to be dissected away or lifted up by hooks.

(3.) The digastric muscle is occasionally bound down by the cervical fascia to a considerable portion of the hyoid bone, and

has to be separated from it before the artery can be reached. This occurred in one of my cases.

(4.) The artery itself has sometimes an abnormal course; it may run on the surface of the hyoglossus muscle instead of beneath it; it may rise at a higher or lower level than usual from the carotid, or in common with the facial or superior thyroid, and cross beneath the hyoglossus at a point above or below the normal one. Whilst ligaturing the lingual on a dead subject this spring I failed to find the artery, and thought I had a case of absence of the lingual, which is a very rare condition indeed; but on further dissecting the parts, I found the artery given off, in common with the superior thyroid, near the bifurcation of the carotid. It then passed up towards the middle line of the neck and over the hyoid bone, internal to the lesser cornu, pierced the hyoglossus muscle and then reached the tongue in the usual way. As I mentioned above, the artery may be absent altogether. These anomalies, of course, are very rare. I have only met one example of each of the last three, in ten years' experience in practical anatomy and a dissection of over 350 bodies.

In ligaturing the lingual the one guide which the operator must rely on is the great cornu of the hyoid bone; it can always be easily felt and its relation to the artery is, practically, always constant. Some authorities advise ligature of the lingual near its origin from the carotid, but here the operation is more difficult, owing to the large veins which often cover it, and to the absence of any certain guide; besides, the artery is not so constant in its point of origin from the carotid as it is in its relation to the hyoid bone and hyoglossus muscle.

Whatever operation for excision of the tongue is practised, the mortality in a series of cases is about the same, so that the method of operating seems to have less effect on the results than the after-treatment. Still certain operations are more favorable than others, as regards the recurrence of the disease, and it is reasonable to suppose that where the disease is more completely removed it is less likely to return.

The advantages of the operation I have described are many:

(1.) The diseased structures, and especially the glands, are discovered and removed with the greatest ease through the neck incisions.

(2.) The removal of the tongue is bloodless and there is no fear of secondary hæmorrhage.

(3.) The incision made by the scissors is a clean cut one, and there is no bruising of the tissues as in the operation with the ecraseur.

(4.) The tongue can be more completely and more easily removed with scissors than with any ecraseur.

(5.) Drainage of the mouth can be more thoroughly carried out by means of the incisions in the neck.

(6.) The operation is easy of performance and few instruments are required, no more than every surgeon possesses, viz: Straight scissors, knife, and a few pairs of Pean's forceps.

It is my belief that the operation of the future for excision of the tongue will be the one that most easily enables the surgeon to remove diseased glands in neck, and that hereafter no operation for removal of the tongue will be considered complete without incisions in the neck through which these diseased glands can be easily felt and removed. Every surgeon now admits that in excision of the breast for malignant disease, it is necessary to look for and remove all diseased glands in the axilla. If this rule is carried out in excision of the breast, why not in excision of the tongue.

One of the three cases in which I made use of Billroth's method of excising the tongue died, but this was not owing to the method of operating, but to an avoidable cause, erysipelas. In the two other cases the disease was far advanced and the structures about the floor of the mouth much involved. In one, the patient lived seven months after the operation, and in the other, fourteen and one-half months; and for six of these he was free from the disease.

Of course no correct deduction can be drawn from so few a number of cases, but on *a priori* grounds the operation seems to me to be one that calls for the support of surgeons.

Billroth's seventeen last reported cases all recovered. This is to be attributed to the after-treatment by antiseptic (iodoform) gauze, a method I followed in my last case, and intend to follow out in all my future ones.

Billroth's operation is to be perferred to that of Kocher on account of its greater simplicity. Kocher performs preliminary

tracheotomy as well as ligature of the linguals. Thirteen out of fourteen of his cases recovered. Still the operation as performed by Kocher is a very formidable one, and I cannot help thinking that the preliminary tracheotomy increases the risk run by the patient.

Case I. Wm. M., æt. 42, came to hospital in November, 1883, suffering from recurring malignant disease of the tongue. In May last had had a portion of the tongue removed for epithelioma. Almost three months ago noticed that stump of tongue was getting sore; this soreness gradually increased, and when he entered hospital the whole stump of tongue was involved, as well as right tonsil and anterior pillar of fauces. The glands in submaxillary region enlarged. Operation November 10; the linguals were first ligatured by a curved incision in each side, from near symphysis to a little below angle of jaw and the affected glands removed, including the submaxillary gland of right side. The tongue was then quickly excised by scissors, and the floor of mouth, right tonsil and right pillar of the fauces cleared of diseased structures. The only hæmorrhage that occurred was whilst removing the right tonsil, which was done through the wound in the neck. The neck wounds were then closed and a large drainage tube put through the inner angle of wound on right side of neck into the mouth, and the whole dressed with iodoform gauze and borated cotton pads.

The man was fed for the first four days entirely by the rectum, the mouth being washed out with a weak solution of Condy's fluid, and pieces of ice given occasionally to quench thirst. For five days the man did well, and the wounds made for ligature of linguals healed by first intention. On November 15, erysipelas appeared on the nose and spread rapidly over the face, head, neck and chest; temperature 103–104°; pulse 120. The wound in mouth now became sloughy. This condition persisted without special change until the 27th, when the breath became fetid and a cough developed with indications of septic trouble in the lungs. During all this time there had been no rigors or sweatings. He gradually became weaker, and on December 2 died suddenly of profuse hæmorrhage from the lungs. At the autopsy the mouth wound looked in process of healing, and the disease had apparently been all removed; the wounds made in neck for ligature of linguals were completely healed and the arteries themselves presented thrombi at the site of ligature. There was a small pocket of pus beneath the left sterno-mastoid muscle; the trachea and bronchi were filled with blood. The right lung presented four areas of circumscribed

gangrene; the left lung two, each about the size of small apples. Placing the lung under water, and blowing air through the pulmonary artery, bubbles escaped from one of the gangrenous regions close to the root of the lung. Dissection showed that the hæmorrhage came from a small branch of one of the main divisions of the bronchial artery which had been opened in the necrotic process.

The bad result of the operation was in no way due to the manner in which it had been performed. The wound in the neck healed without difficulty and added nothing to the risk. The erysipelas was no doubt developed from a case which had been inadvertently admitted into the same ward a few days before.

CASE II. Thos. K., æt. 54, a tall, spare man, of intemperate habits and an inveterate smoker, was brought to me by Dr. Geo. Ross, February 24, 1884, suffering from cancerous disease of under surface of the tongue and the gum lining the inner side of the middle of jaw. Four months ago first noticed a lump under right side of tongue which increased rapidly in size and soon ulcerated. Had, when first seen, a hard cancerous growth involving the whole of the under surface of the tongue near the root, the floor of the mouth and the gum lining the lower jaw. The submaxillary glands and deep cervical glands much enlarged. Removal of tongue and floor of mouth decided on. The operation was performed February 25, 1884. The linguals were first ligatured by same incision as in previous case. The ligature of the right lingual was rather difficult owing to the great enlargement of the submaxillary gland. The gland was removed and facial tied as well. The ligature of left artery was comparatively easy, except that a large vein at outer edge of wound was wounded and gave rise to considerable hæmorrhage, which, however, was soon stopped by a Pean's forceps and the vein tied. The left submaxillary gland was not taken away. Through the incisions in neck some enlarged cervical glands were removed. Both arteries were tied in two places with catgut and divided between the two ligatures. They were large and tortuous. After drawing out the tongue by a ligature placed a short distance from the tip, it was removed by scissors. The whole tongue was thus removed without difficulty and without hæmorrhage. The diseased gum and the floor of the right side of the mouth was then dissected away, leaving free communication between the external wound and the mouth. The wounds in neck were then sewed up with catgut and on the right side a large drain put through the wound into the mouth; the mouth was packed with iodoform cotton wool. The patient did very well, the temperature not rising above 99°. Every day for the first week

the mouth was washed out by means of the drainage tube and the packing daily replaced. The wound in the neck healed by first intention except where drainage tube remained, and there never was the slightest trace of fetor. As in the first case, the patient was fed per rectum the first few days with beef tea and brandy, and after that he took his nourishment by the mouth. In three weeks the patient went home with the mouth wound all healed and only a small fistulous opening in neck where drainage tube had been.

The disease returned in floor of mouth two months after the operation, but his general health remained good. By July the growth had increased considerably and in September he began to have hæmorrhages, till finally he died of exhaustion September 21, 1884, about seven months after the operation.

CASE III. Wm. H., æt. 60, a robust, healthy looking man, carter, came to the Montreal General Hospital May 14, 1884, complaining that he had a sore under his tongue which was very painful and which was rapidly getting worse.

Some months ago first noticed a small lump on the under surface of the left side of the tongue; this gradually increased in size till four weeks ago, when it broke and left an ulcer. On examination a foul, slough-looking ulcer, size of a twenty-five cent piece, with ragged edges and a hard indurated base, was found on the under surface of the tongue a little to the left of the frenum. The submaxillary glands of that side and the deep cervical glands were enlarged and indurated. Diagnosis, malignant disease. The operation of removal of the tongue was performed on May 15, 1884. The linguals were tied by the same incision as other cases. The right artery was tied without much difficulty, except that the digastric tendon was bound down to the hyoid bone to a greater extent than usual and had to be separated. On the left side, owing to the great enlargement of submaxillary gland, the space between it and the hyoid bone was much constricted and the artery was secured with greatest difficulty. In the dissection the large temporo-facial vein had to be tied. The submaxillary gland of this side was then removed and the facial artery tied, and by extending the incision outwards the enlarged cervical glands which were on the sheath of the vessels were removed. The tongue was then excised with scissors in the usual way without hæmorrhage; but as the last snip was made the epiglottis fell back and almost asphyxiated the patient. I immediately introduced my finger, turned back the epiglottis and passed a catgut ligature through and made it fast outside the mouth. The wounds in the neck which had been filled with carbolized sponges were now well

washed out with bichloride solution and sutured. As there was an opening into the mouth on the left side owing to the extensive dissection of the floor of mouth and removal of the submaxillary gland, a large drainage tube was passed into the mouth. The wound was then dressed with iodoform gauze and borated cotton and a bandage applied. The mouth was also packed with the same gauze and then the operation was complete.

The patient recovered well from the operation. He was fed per rectum for a week and the dressings in mouth and left side of neck removed daily, and the parts thoroughly washed through the large drainage tube. By the end of the first week the wounds in the neck, except where drainage tube passed into the mouth, were healed by first intention and the mouth wound was looking healthy and healing rapidly. It was found that the patient was totally unable to swallow liquids, so he was fed by a tube passed into pharynx. By June 1 the wound in the mouth had healed entirely and the only part that remained unhealed was the fistulous opening where the drainage tube had been. The patient was very self-willed and of an irascible disposition and frequently used to get up at night in spite of the nurses and walk about. He in this way contracted a bronchitis which kept him in hospital longer than he otherwise would have been; his breath and expectoration were fetid, the latter was very profuse. He still was unable to swallow fluids, but could take solids fairly well, so he was still fed with the pharyngeal tube. He left the hospital June 17, a little more than a month after the operation. In January, 1885, eight months after the operation, he came to see me and at that time he had some enlargement of the glands of the neck, but mouth was perfectly clean. He still had to take his liquids by means of a tube, which he passed himself; his family told me that nothing would induce him to attempt to swallow liquids without the tube. In June, 1885, the glands on both sides of neck were enlarged and he had some induration in floor of mouth; this gradually increased and he failed rapidly, dying of exhaustion July 29, 1885.

Although the results in these three operations are not very brilliant, still I feel that had I similar cases to deal with again I would operate in the same way. In all three cases the disease was very extensive and not confined to the tongue alone, the involvement of the glands being a marked feature. In such cases any attempt to remove the diseased structures, without the neck incisions, would have been as useless and as unscien-

tific as operating on cancer of the breast and allowing the enlarged glands in axilla to remain without extending the incision to remove them. In the two cases which lived the relief was evident, though in Case II not so permanent as one could have wished. In Case I the neck wounds were in no way responsible for the fatal result and in the other two cases did not retard recovery, but, on the contrary, rather hastened it by the greater facility afforded for drainage and thorough washing of the mouth.

In each of the three cases removal of the tongue was remarkably bloodless and even the ligature of the linguals was not attended with any hæmorrhage worth mentioning. The facility with which the affected glands were removed through the neck wounds was very great.

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